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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/684,939	10/14/2003	Keiji Mabuchi	09792909-5698	7761

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EXAMINER	
INGHAM, JOHN C	
ART UNIT	PAPER NUMBER
2814	

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	03/07/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

Office Action Summary	Application No.	Applicant(s)	
	10/684,939	MABUCHI, KEIJI	
	Examiner	Art Unit	
	John C. Ingham	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *12 December 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) *10-15* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-9 and 16-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *14 October 2003* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *1/18/007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of claims 1-9 and 16-31 in the reply filed on 12 December 2006 is acknowledged.

Drawings

2. Figures 7-9 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Objections

3. Claims 9 and 24 are objected to because of the following informalities: the claim recites that the gate wiring of the drain transistor is short-circuited common between all the transistors, but Figure 3 shows the common node to be the drain wiring of the transistor – not the gate. The claim also recites that the amplifier transistor gate wiring extends along the pixel row, but Fig 3 shows that the amplifier gate has no shared

wiring. Appropriate correction is required. The claim has been treated as shown in Fig 3 and explained in paragraph 1 of page 17.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims **1-8, 16-23 and 27-31** is rejected under 35 U.S.C. 102(e) as being anticipated by Fox (US 6,566,697).

6. Regarding claims **1 and 16**, Fox discloses in Fig 1 a camera apparatus for outputting an image taken by a solid-state imaging device (col 2 ln 1-6), the camera apparatus comprising: the solid-state imaging device having an imaging region section (10) provided with a plurality of pixels and a processing circuit section for processing an image signal outputted from the imaging region section (col 1 ln 20-30), the solid-state imaging device comprising: the pixel having a photoelectric converting element (12) for generating a signal charge commensurate with a light-receiving amount, a floating diffusion part (18) for detecting an amount of a signal charge generated by the photoelectric converting element, a transfer transistor (16) for transferring a signal charge generated by the photoelectric converting element to the floating diffusion part, and a drain transistor (22) for draining a signal charge generated by the photoelectric converting element; the photoelectric converting element being formed by a buried

photodiode (Fig 8) having a charge separating region formed by a first conductivity type high-concentration impurity layer (Fig 8 item p) in an extreme surface of a semiconductor substrate and a charge storing region formed by a second conductivity type impurity layer (Fig 8 item n) in a layer beneath the charge separating region; both a channel potential on the drain transistor being turned on and a channel potential on the transfer transistor being turned on being set higher than a potential for depleting the photodiode (Fig 3).

7. Regarding claims **2 and 17**, Fox discloses in Fig 1 the device of claims 1 and 16, further having a reset transistor (20) and an amplifying transistor (24) and a selecting transistor (28).

8. Regarding claims **3 and 18**, Fox discloses in Fig 3 the device of claims 1 and 16, wherein the transfer transistor (TCK) has a gate electrode, and the drain transistor has a gate electrode. In reference to the claim language referring to the function of the gate electrodes forming a first conductivity channel layer at an interface to a gate insulation film in a charge storing time period, intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963).

9. With regards to claims **4 and 19**, Fox discloses in Fig 1 the device of claims 1 and 16. The claim language referring to the simultaneous resetting, simultaneous signal transfer, row by row signal read-out, and the fact that the drain transistor is kept on until

the reading operation proceeds to a predetermined row, describes an intended use of the device. Intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963).

10. With regards to claims **5 and 20**, Fox discloses in Fig 1 the device of claims 4 and 19 wherein the photodiode, when substantially depleted, includes no charges (col 1 ln 15-17) after readout or reset.

11. Regarding claims **6-8 and 21-23**, Fox discloses the device of claim 4 and 19. In reference to the claim language referring to the voltage applied to the gates of the individual transistors, and that the drain transistor is off during a read operation, intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963).

12. Regarding claims **27 and 30**, Fox discloses in Fig 1 a solid-state imaging device comprising: a plurality of pixels (Fig 4); the pixels having a light-receiving part (12), a transfer transistor (16) for substantially depleting (col 1 ln 15-17) the charge storage region included in the light-receiving part and reading out a charge generated in the light-receiving part and a drain transistor (22) for draining the charge generated in the

light-receiving part, the light-receiving part having a charge storing region (14) having a potential increasing as the stored charge decreases during reading out charges and during draining charges (Fig 3) but lower than a potential on a channel part in a state the transfer transistor is on and a potential on the channel part in a state the drain transistor is on when the charge storing region is substantially depleted.

13. With regards to claims **28 and 31**, Fox discloses in Fig 1 the device of claims 27 and 30 wherein the charge storing region, when substantially depleted, includes no charges (col 1 ln 15-17).

14. Regarding claim **29**, Fox discloses in Fig 1 the device of claim 27, wherein the pixel further has a charge holding part (18) for holding a charge read out by the transfer transistor (16). In reference to the claim language referring to the charge being read simultaneously on all the pixels, the charge being read out in a predetermined order, and the pixels being drained by the drain transistors to start an exposure time period, intended use and other types of functional language must result in a structural difference between the claimed invention and the prior art in order to patentably distinguish the claimed invention from the prior art. If the prior art structure is capable of performing the intended use, then it meets the claim. In re Casey,152 USPQ 235 (CCPA 1967); In re Otto , 136 USPQ 458, 459 (CCPA 1963). In this case, a row of the pixel structures of Fox is capable of being read simultaneously, or in a predetermined order, and the drain transistor voids the pixel of unwanted charge (col 1 ln 15-17).

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

16. Claims **9 and 24** are rejected under 35 U.S.C. 103(a) as being unpatentable over Fox. Fox discloses in Fig 3 an apparatus according to claims 2 and 17, wherein the transfer (16), reset (20) and select (28) transistor are driven on a pixel-row basis (col 5 ln 1-7). Fox does not specify that the transfer, reset and select transistor gate wiring is provided in a row direction while the drain transistor (22) gate wiring is along the column direction, but does recite that the voltages (VOD, VPR, VDD) may be short-circuited together. However, it is well known in the art that gate wiring for pixel transistors runs between pixels in either the row or column direction, to be driven by horizontal and vertical scanning circuits. Additionally, Fox discloses a timing diagram in Fig 4B, where the separate EC signal is held on a column while each row is sampled (transfer, reset, select). It would have been obvious to one of ordinary skill in the art at the time of the invention to arrange the wiring of the transfer, reset and select transistors in the row direction, since they are driven on a row basis, while the drain transistor wiring is arranged along the column direction since it is driven in the vertical direction.

17. Claim **25** is rejected under 35 U.S.C. 103(a) as being unpatentable over Fox and Fossum (US 6,624,456). Fox discloses the apparatus of claim 16, but does not specify

switch means for switching shutter operation of the imaging device between focal-plane shutter and all-pixel simultaneous shutter operation.

Fossum teaches that image sensors may be operated in two ways, one being the rolling shutter (or focal-plane shutter) mode, and the other being an all-pixel simultaneous operation (col 1 ln 12-24), depending on whether the application requires more time consistency. It would have been obvious to one of ordinary skill in the art at the time of the invention to use the teachings of Fossum on the apparatus of Fox depending on whether the application required more time consistency.

18. Claim **26** is rejected under 35 U.S.C. 103(a) as being unpatentable over Fox and applicant's admitted prior art (AAPA). Fox discloses the apparatus of claim 19, but does not specify exposure time selecting means for selecting an exposure time of the device and exposure start row selecting means for selecting the predetermined exposure start row depending on the exposure time selected by the exposure time. However, since Fox has a pixel that is fully depleted during charge transfers, the rows are capable of being selected based on a predetermined exposure time and exposure can be started during readout of signals. It is well known in the art to include exposure time selecting means on cameras. AAPA recites that exposure had been impossible during a transfer duration over all the rows, and therefore exposure time could not be increased. Since Fox is capable of having exposure and readout occurring simultaneously, it would have been obvious to one of ordinary skill in the art at the time of the invention to include exposure time selecting means that select rows for exposure depending on an exposure time selected.

Conclusion

19. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Yoneda (US 2001/0012133) discloses the arrangement of transistor gate lines in row and column directions.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to John C. Ingham whose telephone number is (571) 272-8793. The examiner can normally be reached on M-F, 8am-5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

John C Ingham
Examiner
Art Unit 2814

jci

HOWARD WEISS
PRIMARY EXAMINER